PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

To:

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WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY
(PCT Rule 43*bis*.1)

Applicant's or agent's file reference see form PCT/ISA/220	Date of mailing *(day/month/year)* see form PCT/ISA/210 (second sheet) **FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/IB2005/050399	31.01.2005	02.02.2004

International Patent Classification (IPC) or both national classification and IPC
G06K9/00

Applicant
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1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☒ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:

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WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/IB2005/050399

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

   ☐ This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).

2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

   a. type of material:

   ☐ a sequence listing

   ☐ table(s) related to the sequence listing

   b. format of material:

   ☐ in written format

   ☐ in computer readable form

   c. time of filing/furnishing:

   ☐ contained in the international application as filed.

   ☐ filed together with the international application in computer readable form.

   ☐ furnished subsequently to this Authority for the purposes of search.

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-24
	No:	Claims	
Inventive step (IS)	Yes:	Claims	7,8,16
	No:	Claims	1-6,9-15,17-24
Industrial applicability (IA)	Yes:	Claims	1-24
	No:	Claims	

2. Citations and explanations

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

Re Item V.

1. Reference is made to the following document:

D1 : RAGINI CHOUDHURY VERMA ET AL: "FACE DETECTION AND TRACKING IN A VIDEO BY PROPAGATING DETECTION PROBABILITIES" IEEE TRANSACTIONS ON PATTERN ANALYSIS AND MACHINE INTELLIGENCE, IEEE INC. NEW YORK, US, vol. 25, no. 10, October 2003, pages 1215-1228

D2: GONG S., McKENNA S.J. AND PSARROU A.: "DYNAMIC VISION, FROM IMAGES TO FACE RECOGNITION", IIMPERIAL COLLEGE PRESS, 2000

2. **CLAIMS 1 and 13**

2.1 Claim 1.

Document D1, which is considered to represent the most relevant state of the art, discloses (the references in parentheses applying to this document):

A system having a face classifier that provides a determination that a face in a video input is an unknown face if it fails to correspond to any known face stored in the classifier, the system then adding the face to the classifier.

From this, the subject-matter of independent claim 1 differs in that a persistence criterion is further included prior to adding a new face to the classifier

The problem to be solved by the present invention may therefore be regarded as how to prevent that "spurious" or "fleeting" faces "cf. description page 2, lines 10-16) from an input video sequence are added to a face classifier.

The solution to said problem consisting in including a persistence criterion is merely one of several straightforward possibilities from which the skilled person would select, in accordance with circumstances, without the exercise of inventive skill, in order to

solve the problem of preventing "spurious" faces to be added to the classifier (cf. D2 page 135, lines 24-27 and page 245, lines 22-27).

The solution proposed in claim 1 of the present application cannot therefore be considered as involving an inventive step (Article 33(3) PCT).

2.2 Claim 13

2.2.1 The subject-matter of method claim 13 merely relate to a set of intellectual steps which are covered by the provision of Rule 67(1)(iii) PCT. Although the examining division is not under the obligation to formulate an opinion with respect to the subject-matter of this claim (Article 34(4)(a)(i) PCT), the following provisional opinion is nevertheless established:

2.2.2 Claim 13 corresponds mutatis mutandis in terms of method to independent system claim 1. Claim 13 is therefore also considered as lacking an inventive step (Article 33(3) PCT).

3. CLAIMS 2-6 9, 11, 12, 14, 15 and 17-24

Dependent claims 2-6, 9, 11, 12, 14, 15 and 17-24 and do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of inventive step, the reasons being as follows:

3.1 Claims 2-4, 9 and 10

The feature of claims 2-4, 9 and 10 consisting in using a Probabilistic Neural Network (PNN) as a classifier is one of several straightforward possibilities from which the skilled person would select, in accordance with circumstances, without the exercise of inventive skill, in order to solve the problem of selecting a classifier for identifying whether a face is known or not in a video sequence.

3.2 Claim 5, 14 and 22

The feature of Claim 5, 14 and 22 is also disclosed in document as providing the same advantages as in the present application (page 135, lines 24-27 and page 245, lines 22-27). The skilled person would therefore regard it as a normal option to include this feature in the system described in document D1 in order to solve the problem of preventing "spurious" faces to be added to the classifier.

3.3 Claim 6, 15

The feature consisting in tracking the face in the video input is also disclosed in document D1 (section 2.1).

3.4 Claim 11

The feature of claim 11 is also disclosed in document D1 (page 433, left column, lines 3-6).

3.5 Claim 12

The feature of claim 12 is also disclosed in document D1 (page 433, left column, lines 53-61).

3.6 Claim 17

The feature of Claim 17 is one of several straightforward possibilities from which the skilled person would select, in accordance with circumstances, without the exercise of inventive skill, in order to solve the problem of selecting a classifier for identifying whether a face is known or not in a video sequence.

3.7 Claims 18-24

The additional featured of claims 18-24 are also disclosed in document D1 (sections 2.1 and 2.2).

4. CLAIMS 7 AND 16

The solution to the problem of deciding whether an unknown face detected in a sequence of images from an input video should be added to a classifier based on the persistence criterion proposed in claims 7 and 16 of the present application is considered as involving an inventive step (Article 33(3) PCT) for the following reasons:

Calculating the persistence of a face in a sequence of images on the basis that the following criteria:

(i) detection of a sequence of unknown face by a PNN,
(ii) mean PDF of features vectors is below a first predetermined threshold, and
(iii) the variance of feature vectors for the said sequence of faces is below a second predetermined threshold.

are satisfied for a minimum period of time unknown is considered as providing an improved method for preventing that spurious unknown faces are incrementally added to the classifier.

Such a solution is not known from nor suggested by the available prior art.

5. FURTHER REMARKS

5.1 Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the documents D1 and D2 is not mentioned in the description, nor are these documents identified therein.

Re Item VIII.

1. CLAIMS 1, 13 AND 19

The wording "persistence criteria" used in claims 1, 13 and 19 is unclear and leaves the reader in doubt as to the meaning of the technical feature to which it refers, thereby rendering the definition of the subject-matter of said claims unclear, Article 6 PCT.

A way to alleviate this objection would be to include the features of claims 5 and 7 to independent system claim 1, and their corresponding method features to independent method claim 13.

2. CLAIM 19

Claim 19, although drafted as an independent system claim, contains all the features of claim 1. Claim 19 is therefore not appropriately formulated as a claim dependent on the latter (Rule 6.4 PCT).

Furthermore, the wording "prominence criteria" used in claim 19 is vague, thereby rendering the definition of the subject-matter of said claim unclear, Article 6 PCT.

3. CLAIMS 5 AND 14

The wording "the same unknown face is present in the video input for a minimum period of time" used in claims 5 and 14 is vague and leaves the reader in doubt as to the meaning of the technical feature to which it refers, thereby rendering the definition of the subject-matter of said claims unclear, Article 6 PCT.

Said "minimum period of time" could indeed be inferior to the interval between two successive frames in the input video sequence, meaning that the system would not discriminate "spurious" faces appearing only in one single frame. A way to alleviate this objection would be to indicate that the the unknown face is present for at least a

minimum number of frames (or images) of the input video sequence (as specified in Claim 22), said number being superior to one (cf. description page 18 line 13 - page 20, line 3).